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REMARKS

The present Amendment is intended to be fully responsive to all points of objection and/or rejection raised by the Examiner and is believed to place the application in condition for allowance. Favorable reconsideration and allowance of the application are respectfully requested.

Applicant asserts that the present invention is new, non-obvious and useful. Prompt consideration and allowance of the claims are respectfully requested.

Status of Claims

Claims 1-24 are pending in the application.

New claims 20-24 were added.

Applicants respectfully assert that no new matter has been added.

CLAIM REJECTIONS

35 U.S.C. § 103 Rejections

In the Office Action, the Examiner rejected claims 1-4 and 15-17 under 35 U.S.C. § 103(a), as being unpatentable over Underbrink et al. (US 6,754,287) in view of Steensgard-Madsen (US 6,271,782). Specifically, the Examiner contended that Underbrink et al. discloses a portable communication device comprising a sigma-delta N-phase shift keying modulator. The Examiner stated that Underbrink et al. does not teach the sigma-delta N-phase shift keying modulator having a non-uniform polar quantizer, but contended that Steensgard-Madsen teaches a sigma-delta modulator having a non-uniform polar quantizer (Fig. 24 element 228, Fig 27, and column 21 lines 48-67). The Examiner further contended that it would have been obvious to one of ordinary skill in the art at the time the invention was made to include the apparatus/method taught by Steensgard-Madsen into Underbrink's sigma-delta modulator.

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According to M.P.E.P. §2142, In order to establish a *prima facie* case of obviousness, the prior art references must teach or suggest all the claim limitations.

Without conceding the appropriateness of the combination, Applicant respectfully submits that the combination of Underbrink et al. and Steensgard-Madsen does not meet the requirements of an obviousness rejection, in that the combination fails to teach or suggest all the elements of the claimed invention.

Independent claim 1 of the present application recites a sigma-delta N-phase shift keying modulator having a non-uniform polar quantizer (emphasis added). Applicant respectfully submits that Underbrink et al. and/or Steensgard-Madsen, alone or in combination, do not disclose, teach or suggest this feature of claim 1. Specifically, as discussed in detail below, Applicant respectfully traverses the Examiner's contention that Steensgard-Madsen discloses a non-uniform polar quantizer in Figs. 24 and 27.

Applicant respectfully submits that Steensgard-Madsen does not describe, teach or suggest any type of polar quantizer, and specifically does not teach or fairly suggest a non-uniform polar quantizer, as required by claim 1.

Applicant respectfully submits that Steensgard-Madsen describes a pipelined multi-step quantizer for quantizing the sum of an input signal $g(k)$ and a loop filter's output signal $v(k)$ (Column 2, lines 64-66).

Applicant respectfully submits that Fig. 24 of Steensgard-Madsen and the corresponding portions of the specification of Steensgard-Madsen merely describe a basic structure of a continuous-time delta-sigma modulator 226, including a coarse quantizer 228, which is a 5-bit delta-sigma modulator (Column 18, lines 3-10). The coarse quantizer 228 includes a loop quantizer 258 (Fig. 25). Applicant respectfully submits that Steensgard-Madsen does not teach or fairly suggest that coarse quantizer 228 and/or loop quantizer 258 may include a non-uniform quantizer.

Applicant further submits that delta-sigma modulator 226, as described by Steensgard-Madsen, includes a "non-uniform" loop quantizer 236 to improve dynamic-range performance. As shown in Fig. 27, loop quantizer 236 has a small step size in the midrange. The step size is increased near the boundaries of the resolving range (Column 21, lines 49-62). Thus, Applicant respectfully submits that the term "non-uniform" is used by Steensgard-

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Madsen merely to describe the non-uniform step size of loop quantizer 236. Accordingly, quantizer 236, as described by Steensgard-Madsen, does not include a polar quantizer.

Applicant further submits that throughout the disclosure of Steensgard-Madsen the term "non-uniform" relates only to the step-size of the quantizer, e.g., as shown in Fig. 27, and is not mentioned anywhere in the context of a polar quantizer.

Applicant further submits that quantizer 236, as described by Steensgard-Madsen, could not be used to perform the functionality of a non-uniform polar quantizer. Specifically, Steensgard-Madsen describe the multi-step quantization of quantizer 236 is adapted to increase the delta-sigma modulator's internal resolution (Column 22, lines 8-10); and such that the modulator will remain stable if large input signals should leak through the quantizer (Column 21, lines 54-57). In contrast to the quantizer described by Steensgard-Madsen, the sigma-delta modulator including the non-uniform polar quantizer of the present application may have fewer large phase transitions than a standard sigma-delta modulator (paragraph [0027]).

Therefore, Underbrink et al. and/or Steensgard-Madsen, alone or in combination, do not render independent claim 1 obvious.

Independent claims 3 and 15 recite, in paraphrase, producing a quantized output representing a symbol selected from a set of N symbols according to which of a set of N non-uniform cells the phase of an integrated signal belongs, the N non-uniform cells completely covering the complex plane in a non-overlapping manner (emphasis added). Applicant respectfully submits that Underbrink et al. and/or Steensgard-Madsen, alone or in combination, do not disclose, teach or suggest this feature of claims 3 and 15.

As discussed above in connection with claim 1, applicant respectfully submits that Underbrink et al. and/or Steensgard-Madsen, alone or in combination, do not disclose, teach or suggest a non-uniform polar quantizer.

Applicant also submits that Underbrink et al. and/or Steensgard-Madsen, alone or in combination, do not disclose, teach or suggest producing a quantized symbol selected from the set of N symbols according to the set of N non-uniform cells, as recited by claims 3 and 15.

Therefore, Underbrink et al. and/or Steensgard-Madsen, alone or in combination, do not render independent claims 3 and 15 obvious.

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Claims 2, claim 4, and claims 16-17 are dependent from independent claims 1, 3, and 15, respectively, and include all the features of these amended independent claims as well as additional distinguishing features. Therefore, it is respectfully submitted that the patentability of claims 2, claim 4, and claims 16-17 follows directly from the patentability of independent claims 1, 3, and 15, respectively.

In view of the above, Applicants respectfully request that the rejection of claims 1-4 and 15-17 under 35 USC §103(a) be withdrawn.

In the Office Action, the Examiner rejected claims 5, 9, 10 and 14 under 35 U.S.C. § 103(a), as being unpatentable over Underbrink et al. and Steensgard-Madsen as applied to claim 1 above, and further in view of Dent et al. (US 6,181,920).

Independent claims 5 and 10 recite, in paraphrase, a sigma-delta N-phase shift keying modulator having a non-uniform polar quantizer (emphasis added). As discussed above in connection to claim 1, Applicant respectfully submits that Underbrink et al. and/or Steensgard-Madsen, alone or in combination, do not disclose, teach or suggest this feature of claims 5 and 10.

Claim 9 and claim 14 are dependent from independent claims 5 and 10, respectively, and include all the features of these amended independent claims as well as additional distinguishing features. Therefore, it is respectfully submitted that the patentability of claim 9 and claim 14 follows directly from the patentability of independent claims 5 and 10, respectively.

In view of the above, Applicants respectfully request that the rejection of claims 5, 9, 10 and 14 under 35 USC §103(a) be withdrawn.

In the Office Action, the Examiner rejected claims 6, 7, 11 and 12 under 35 U.S.C. § 103(a), as being unpatentable over Underbrink et al. and Steensgard-Madsen and Dent et al. as applied to claim 5 above, and further in view of McCune (US 6,636,112).

Claims 8, claim 13, and claims 18-19, are dependent from independent claims 5, 10 and 15, respectively, and include all the features of these amended independent claims as well as additional distinguishing features. Therefore, it is respectfully submitted that the patentability of claim 8, claim 13, and claims 18-19 follows directly from the patentability of independent claims 5, 10 and 15, respectively.

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In view of the above, Applicants respectfully request that the rejection of claims 8, 13, and 18-19 under 35 USC §103(a) be withdrawn.

Remarks to New claims

New claims 20-24 have been added to more clearly define the subject matter claimed by the present Application. It is respectfully submitted that the newly added claims are clearly supported by the originally filed specification and drawings and add no new matter to the application.

Claim 20, claim 21, claim 22, claim 23, and claim 24 depend directly from independent claims 1, 3, 5, 10, and 15, respectively, and include all the features of these amended independent claims as well as additional distinguishing features.

Therefore, it is respectfully submitted that the patentability of claim 20, claim 21, claim 22, claim 23, and claim 24 follows directly from the patentability of independent claims 1, 3, 5, 10, and 15, respectively.

CONCLUSION

The present communication is intended to be fully responsive to all points of rejection raised by the Examiner and is believed to place the application in condition for allowance. Favorable reconsideration and allowance of the application is respectfully requested. It is submitted that the application is now in condition for allowance. Prompt notice of allowance is respectfully requested.

Should the Examiner have any question or comment as to the form, content or entry of this Amendment, the Examiner is requested to contact the undersigned at the telephone number below. Similarly, if there are any further issues yet to be resolved to advance the

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prosecution of this application to issue, the Examiner is requested to telephone the undersigned counsel.

Please charge any fees associated with this paper to deposit account No. 50-3355.

Respectfully submitted,

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